U. S. Department of Transportation

Federal Aviation Administration

Interface Requirements Functional Description Document

Coordination DRAFT

Functional IRD only

Version 1.0

20 November 2009

Tower Data Link Services (TDLS) and En Route Automation Modernization (ERAM) Data Communications Program Segment 1

INTERFACE REQUIREMENTS DOCUMENT

APPROVAL SIGNATURE PAGE

Approval Signatures – Not Required but kept here to ensure cross-domain coordination			
Participant	**Name**	**Signature**	**Date**
AJW	Data Comm Program		
AJT	TDLS Program		
AJE	ERAM Program		

REVISION RECORD			
Revision Letter	**Description**	**Date**	**Entered By**

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FIGURES

TABLES

1   SCOPE

1.1   Identification

This Interface Requirements Functional Description Document was prepared to describe the functional interface between the Tower automation and the En Route automation to support Data Communications Program (DCP) Segment 1 functionality. It identifies the Tower Data Link Services (TDLS) system and the En Route Automation Modernization (ERAM) system as the end systems, and provides the functional requirements for the logical interface between these two systems, without assuming a specific architecture and design. However, it should be noted that this document does assume the use of the planned ERAM data storage capability to exchange data communication context management information.

This document is referred to as an Interface Requirements Document (IRD) but it is not designed to be used as the actual interface requirements document. The assumed architecture includes intermediate systems which have their own IRDs into which these requirements will be integrated; this TDLS-ERAM IRD describes the end system functional requirements only.

Figure 1-1below illustrates the relationships of this document to the IRDs for the assumed intermediate systems. Within the context of this diagram, there is an assumed intermediate system, the Terminal Data Distribution System (TDDS), between the TDLS and ERAM end systems. In addition, there is an assumed intermediate system, ERAM SWIM, which provides flight data distribution capability. As noted above, these assumed intermediate systems are included in this document for discussion but are not functionally required.

NOTE: THIS IS A WORKING DRAFT.

V1.0, 20 November 2009

Figure 1-1 Interface Functional Architecture and IRDs

1.2   Scope

The logical interface described in this document provides for the transfer of flight data and data communications data from an ERAM in an Air Route Traffic Control Center (ARTCC) to a TDLS located at an airport tower underlying the ARTCC, in order to support the automated delivery of pre-departure clearances to aircraft departing the airport. This data exchange includes supporting the legacy ground-ground interface as well as the enhanced air-ground data link directly to the aircraft in the 2013-2017 timeframe (Data Communications Program Segment 1). It also includes the transfer of tower-originated departure clearance events, such as the successful delivery of a clearance or the successful initiation of a data link connection, from TDLS to ERAM, and a two-way data exchange to manage Data Comm context management information.

This IRD does not directly address the DCP Segment 2 requirements in the 2018+ timeframe. The expansion of services to the terminal domain in Segment 2 will result in the expansion of the data elements exchanged between the tower and en route domains. The current FAA Automation and Communication Roadmaps indicate that the TDLS system will be subsumed by the Tower Flight Data Manager (TFDM) automation system in the Data Comm Segment 2 timeframe. The focus of this IRD is to define the Segment

1 data elements that need to be included in the relevant IRDs for ERAM, TDLS, and any implementing intermediate systems.

This document is focused on the TDLS/Pre-Departure Clearance (PDC) and TDLS/Departure Clearance (DCL) applications, which are the primary scope of the Data Comm planned enhancements for the tower domain. TDLS currently has three applications: TDLS/PDC for pre-departure clearances, TDLS/Flight Data Input Output (FDIO) Emulator for flight data functions, and TDLS/Digital Automatic Terminal Information Service (D-ATIS) for terminal Automatic Terminal Information Service (ATIS) information. Data Comm Segment 1 will augment the PDC application to cover DCLs (air-ground departure clearances); this application is referred to in this document as the TDLS/DCL application. Any enhancements to support other automation changes, such as replacing the TDLS/FDIO Emulator, are out of scope of this interface description document.

In addition, this document does not include other overall system requirements, such as data recording, resource utilization recording and analysis requirements that are levied on most National Airspace System (NAS) systems. These system requirements need to be taken into account during systems engineering analyses of the interface since they are included in the Data Comm service string and end-to-end performance requirements, thus impacting the capability of the interface to support the operational and system requirements of the end-to-end system.

1.3   Subsystem Responsibility List

The interfacing subsystems, and the common names and the responsible FAA program office for each, are shown in Table 1-1. Note that TDLS and ERAM are the designated end systems. The assumed intermediate systems are dependent on the actual physical design but are included for completeness.

Table 1-1 Organizational System Responsibility

SUBSYSTEM	Common Name	Responsible FAA Program Office
TDLS	Tower Data Link Services	AJT
ERAM	En Route Automation Modernization	AJE
ERAM SWIM FIS	ERAM System Wide Information Management (SWIM) Flight Information Service (FIS)	AJE
ESAS	ERAM SWIM Application Service (ESAS)	AJE
TDDS	Terminal Data Distribution System	AJT

2   APPLICABLE DOCUMENTS

The following documents form a part of this Interface Description document to the extent specified herein. In the event of a conflict between the documents referenced herein and the contents of this IRD, the contents of this IRD shall be the superseding requirements.

2.1   Government Documents

	Doc ID/Document Number	Document Title[common name]	Rev	Date	Originating Organization
1	DCP FPR	Data Communications Final DRAFT Program Requirements	DRAFT	8/19/09	FAA AJW Data Comm Program
2	ERAM SWIM RD	ERAM SWIM Requirements Document		6/05/09	FAA AJE ERAM SWIM
3	ERAM SWIM IRD/ FAA-ERAM-2009-00616	En Route Automation Modernization (ERAM) To System-Wide Information Management (SWIM) Service Consumers Interface Requirements Document (IRD) [ERAM SWIM IRD]	DRAFT	11/09/09	FAA AJE ERAM SWIM
4	TDDS –TLDS IRD	Terminal Data Distribution System (TDDS) System – TDLS Interface Requirements Document (IRD)	DRAFT	10/17/09	FAA AJT TDDS
5	TDLS RD	Tower Data Link Services (TDLS) Requirements Document	DRAFT	2/04/09	FAA AJW TDLS

2.2   Non-Government Documents

2.3   Guidance Documents

	Document Title	Rev	Date	Originating Organization
6	TDDS Trade Study[1]	1.0	10/30/09	Data Comm SE

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[1] Draft Engineering document, not for publication

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	Document Title	Rev	Date	Originating Organization
7	ERAM R2 SWIM Cycle 2 Show and Tell Briefing		7/01/09	Lockheed Martin ERAM Team
8	ERAM R2 SWIM Cycle 1 Show and Tell Briefing		7/01/09	Lockheed Martin ERAM Team
9	FAA NextGen Data Communications Town Hall Briefing		10/15/09	FAA AJW, Data Comm Program

3   INTERFACE REQUIREMENTS

This section provides the functional interface requirements and assumed design characteristics for the interface.

3.1   General Requirements

This interface provides for a two-way data exchange between a TDLS located at an airport tower and its overlying ERAM in the ARTCC. The transfer of flight data and data communications data from an ERAM to a TDLS supports the automated delivery of pre-departure clearances to aircraft departing the airport.

This IRD also includes the transfer of tower-originated departure clearance data and data link connection status from TDLS to ERAM, and a two-way data exchange for Data Comm context management information.

3.1.1   General System Description

The Data Comm program scope encompasses ground automation, air-ground network communications and aircraft avionics, as illustrated below. The scope of this interface document is between the ground automation in the tower and the ground automation in the center, e.g., ARTCC.

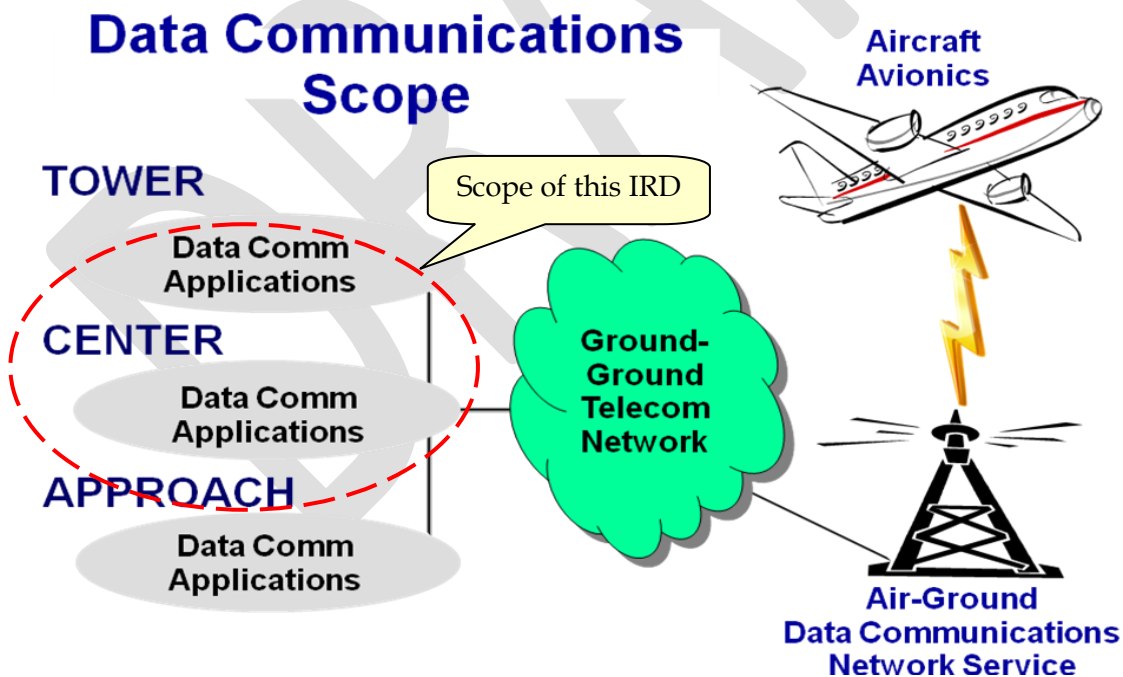**Figure 3-1 Data Communications Scope**

3.1.2   Interface Assumptions

Although there are ongoing engineering discussions and analyses in progress, the current assumptions have been made about the implementation of the data exchange in this IRD.

Note that within this document, the term "PDC" will be used to refer to the current Pre-Departure Clearance (PDC) capability for sending a departure clearance to an Airline Operations Center (AOC). "DCL" refers to the Departure Clearance (DCL) service that sends a departure clearance to the aircraft via Controller-Pilot Data Link Communication (CPDLC), which is being added by the Data Comm Segment 1 program.

1. The ERAM SWIM FIS service is the planned mechanism for other automation systems to access the ERAM flight data management capability in the DCP Segment 1 timeframe. This is currently understood to be provided via a dedicated server(s), the ERAM SWIM Application Server (ESAS), which will service all 20 ARTCCs. Therefore, flight data provided by ERAM to TDLS/DCL is expected to be furnished by the ERAM System Wide Information Management (SWIM) Flight Information Service (FIS).   [*Ref 2*]

2. ERAM will continue to support FDIO in all towers where TDLS is currently deployed during this timeframe. This includes supporting the flight strip printing capability in the tower. Note that FDIO supports multiple other systems in addition to TDLS

3. TDLS will retain its existing FDIO Emulator interface for exchanging data with ERAM via FDIO. The FDIO Emulator application within TDLS is separate from TDLS/PDC today and TDLS/DCL in Data Comm Segment 1. The TDLS/FDIO Emulator will continue to support the current two-way data exchange [see appendix for details] with ERAM via the FDIO RCU interface until such time as it is transitioned to a SWIM interface or subsumed by TFDM.   .

4. It is not yet clear whether TDLS/PDC will retain its current interface from the FDIO flight strip printer interface in order to support PDCs during the initial transitions or migrate to the ERAM SWIM FIS service for both legacy PDCs and new DCLs. The new Departure Clearance Service (DCL) will require the SWIM FIS interface in order to provide revised departure clearances and air-ground communications.

3.1.3   Interface Constraints

1. Context management information needed for air-ground communication to support departure clearances will be exchanged between TDLS and ERAM via the ERAM SWIM FIS interface. This is a logical two-way data exchange; e.g. logon status is sent from ERAM to TDLS and session start status is sent from TDLS to ERAM.

2. The assumed interface between the ERAM SWIM FIS service and TDLS is a SWIM intermediate system, the Terminal Data Distribution System (TDDS). It is to be determined whether this intermediate system will be able to meet the program schedule and technical requirements needed to support the accelerated capabilities for Data Comm Segment 1.

3.1.4   Human-System Interface Requirements

This IRD imposes no explicit Human-System Interface requirements.

3.2   Functional Requirements

This subsection describes the functional requirements of the interface. It does not attempt to identify the design details or the detailed Application Processes (AP) associated with both systems. These requirements describe the information transferred between TDLS and ERAM and the high level services that expect to use the data exchanges.

3.2.1   Application Processes

An Application Process (AP) is defined as an identifiable set of cooperating capabilities within a system that executes one or more information processing tasks. The following paragraphs describe the application processes.

3.2.1.1   Identification of Each Application Process

TDLS and ERAM are each considered to be a single Application Process for purposes of this IRD.

3.2.1.2   Category of Services Required by the Application Processes

The following data exchange functions shall be Efficiency-Critical.
    (a) Flight Information needed to issue DCL clearances, and
    (b) Reconstitution and Automatic Failure Recovery

The following data exchange functions shall be Essential:
    (a) Logon Information,
    (b) Data Comm Session Status Information, and
    (c) DCL Clearance Status

The following function shall be Routine:
    (a) System Status information (except that which is needed for Reconstitution and Automatic Failure Recovery)

3.2.1.3   Information Units

The basic unit of information for the TDLS-ERAM interface is assumed to be a message in this document. It will be defined in detail in the relevant intermediate system IRDs and subsequent ICDs. This section describes the flight-specific information that is required to be exchanged and that is independent of any implementation approach.

3.2.1.3.1   Information Structure

The high level interface summary and data items included in each interface exchange are shown in the following tables.

Table 3-1 High Level TDLS-ERAM Data Exchange

- Flight Data from ERAM
  - Full route of flight
  - Existing FDIO flight strip data
  - ICAO flight plan equipment data
  - Flight status change, e.g., flight departs or is cancelled

- Updated Flight Data from TDLS
  - Departure clearance information
  - Updated flight data (extensible, more than flight plan amendment data)

- Interface Status Data
  - Health Checks
  - Reconstitution

- Logon, Connection Management Data from ERAM
  - Logon information
  - Connection management information
  - Flight plan correlation status

- Connection Management Data from TDLS
  - Connection start/termination
  - Request for flight plan correlation

In the following tables, the data elements have been identified based on the following functional framework:

1. Separate tables are provided for En Route to Tower exchanges and for Tower to En Route.

2. Separate tables are provided for the logon and session/connection information that is required to support air-ground communication management, and for the flight data that is also required to support clearance generation and delivery functions.

3. The current design approach is to use the En Route system and its flight data storage and publication capability (via ERAM SWIM FIS service) to facilitate the management of data communications data among the domains.

3.2.1.3.1.1 Logon and Connection Information

Table 3-2 represents the data elements specifically needed to support controller-pilot communications, which include logon and session information from ERAM to TDLS.

ERAM shall provide the data elements identified in Table 3-2 En Route to Tower Logon and Connection Information.

Table 3-2 En Route to Tower Logon and Connection Information

#	Data Item	Direction	Description	Comments
1	Aircraft 24-bit address from Logon Request	ER to Tower	Network address of the aircraft. Provided by the aircraft in the logon request	*Should be kept separate from the one filed with the flight plan, which is also available from the flight object. Both are needed for performing correlation. Not to be confused with 24-bit address stored in the flight plan*
2	Aircraft Registration/Tail Number	ER to Tower	Tail number, aircraft registration.	*TDLS will need this for FANS connection establishment.*
3	Aircraft CPDLC Application Version Number	ER to Tower	Application version number for the CPDLC. Provided by the aircraft in the logon request.	*Not sure if this information will be used by TDLS (vice CMA in ER) but keep in IRD for now. Currently only two versions are defined in the standards for ATN. Version number should be checked at logon for compatibility with the ground DC capabilities. It is subsequently used to determine how to handle the CPDLC with the aircraft.*
4	Aircraft CPDLC Application Address (TSAP)	ER to Tower	The address where the CPDLC application can be reached on the aircraft. Provided by the aircraft in the logon request. Used to establish a session with the aircraft.	*This is a must have piece of data for TDLS. For recovery this and the flight ID as paired are the most important information.*
5	FIS[2] Application Version Number	ER to Tower	Provided by the aircraft in the logon request	*To be used when aircraft are requesting FIS services. Version number should be*

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2 FIS (Flight Information Service) has two separate and distinct descriptions. In this context, it is the Data Communications (global) flight information service, which provides weather and environment information between ground automation and aircraft. For ERAM SWIM, FIS represents the ERAM provided flight data service among ground automation systems.

#	Data Item	Direction	Description	Comments
				checked at logon for compatibility with the DCGS capabilities. It is subsequently used to determine how to handle the aircraft requests if there are multiple versions in the future.
6	Terminate CPDLC Session Indication	ER to Tower	Indicates that the CPDLC session with a particular aircraft should be terminated	*This is expected to be sent when a relogon situation indicates that the current session with that aircraft should be terminated.*
7	Start CPDLC Session Indication	ER to Tower	Indicates that the CPDLC session with a particular aircraft can be initiated	*This is expected to be sent right after a successful logon and successful FP correlation from an aircraft on the surface*
8	Correlation Success Indication	ER to Tower	Indicates if a requested flight plan correlation was successful or not	*Based on the assumption that tower would request ERAM to provide the Flight Plan Correlation Service*
9	Logon Status	ER to Tower	Indicates the logon status of the aircraft	*This is information that tower needs for exception cases when a manual session start is required. TBD if this is a request/reply or subscription.*
10	Session Status	ER to Tower	Indicates the session status of the aircraft	*TDLS to check the existing status prior to attempting to establish a session. TBD if this is a request/reply or subscription.*

Table 3-3 represents the data elements specifically needed to support controller-pilot communications, which include logon and session information from TDLS to ERAM.

TDLS shall provide to ERAM the data elements identified in Table 3-3 Tower to En Route Logon and Connection Information.

Table 3-3 Tower to En Route Logon and Connection Information

#		Direction	Description	Comments
1	Session/connection Status	Tower to ER	Indicates whether a session has been successfully setup or terminated for a particular aircraft	*TDLS will send on initiation and on termination.*
2	FP Correlation Request	Tower to ER	Request from TDLS to ERAM to perform FP Correlation for a specific flight. TDLS will determine when to start a session, as well as handle manual session starts. Includes FLID/FLUID/GUFI.	*Assumption is that the function will be performed by ERAM. This is an explicit service request to perform a function and return the result. This may be a new Service provided by ERAM SWIM but would use the same basic function that ERAM will provide to do FP correlation at logon.*

3.2.1.3.1.2 Flight Information

Table 3-4 describes the flight data elements needed to support generation of a departure clearance, from ERAM to TDLS. The data is needed for both the legacy PDC and the new DCL. All items currently on a departure flight strip supplied via the FDIO interface are assumed to be relevant for this ERAM-TDLS exchange. New items are added to support the DCL or to facilitate the operational synchronization of PDCs and DCLs. Note that this data exchange from ERAM is in addition to the logon and connection data elements described in Table 3-2 above.

ERAM shall provide flight data in accordance with the ERAM SWIM FIS filtering and selection options defined by TDLS. *Note that is assumed to be met by ERAM SWIM Consumer IRD requirements for subscription and publication, but it is included here to highlight the need for TDLS-specific options.*

ERAM shall provide the flight data elements identified in Table 3-4 En Route to Tower Flight Information.

Table 3-4 En Route to Tower Flight Information

#	Data Item	Description	Notes
1.	Aircraft ID	Call sign	*This is what is sent today on the FDIO flight strip. Needed for ops use, and is part of the ERAM FLUID.*
2.	Computer Identification (CID)	ERAM ID	*This is what is sent today on the FDIO flight strip. Needed for ops use, and is part of the ERAM FLUID.*
3.	ERAM Flight Unique ID (FLUID)	ERAM FLUID. Unique ID among all ERAMs	*Uniquely identifies the flight. Assumption is that it includes airport, callsign, date, time and flight leg.*
4.	NAS Unique Flight ID	Global Unique Flight ID (GUFI)	*Uniquely identifies the flight among NAS automation systems. This is the end state, and not likely to be available in early implementation, this will be ERAM FLUID. When available, the GUFI will replace ERAM FLUID.*
5.	Registration/Tail number from filed flight plan		*Could be used to perform FP correlation within TDLS if needed and/or post-analysis/archiving. Needed for FANS aircraft.*
6.	24-bit address from filed flight plan	Network address of the aircraft. Provided by the ICAO flight plan	*Could be used to perform FP correlation within TDLS if needed. May be available for FANS aircraft (optional field).*
7.	Strip Revision Number	Current revision number on last strip sent to tower FDIO	*The FDIO strip number is needed for legacy PDC, archiving and analysis, and also to ensure operational synchronization between TDLS display and paper strips in the tower.*
8.	Flight System Plan Version Number	Revision or version number associated with change to the flight plan/system plan.	*The number and type of change together are needed so that TDLS can determine whether a revised clearance is needed. This is independent of the flight strip*

#	Data Item	Description	Notes
			revision number. See below for type of change indication.
9.	Flight System Plan Revision Indicator	Revision indicator that flight plan has been modified since filed. Separate value if modification is only for application of auto-route, e.g., PDR/ADR, or non-clearance changing, versus if actual change to route.	*Needs to be for any changes that result in a change to the clearance, e.g., route or altitude, which would normally reprint a strip if the strip had already been printed. If change only generates a Flight Plan Update, e.g., EDCT change, then this would be different value. Want to leverage ERAM logic, and then add to it in TDLS as needed to support DCL and PDC.* *Needs to be worked with ERAM SWIM and En Route.*
10	Number of aircraft in flight/ Heavy Indicator/ Aircraft Type/ Equipment	per 7110.65	This is what is sent today on the FDIO flight strip.
11	Requested Altitude	Hundreds of feet MSL or flight level for class A airspace	This is what is sent today on the FDIO flight strip.
12	Assigned beacon code	Center assigned beacon code for pairing SSR data with the flight	This is what is sent today on the FDIO flight strip.
13	Departure Airport	Airport Identifier	
14	Proposed Departure Time	hh:mm zulu	This is what is sent today on the FDIO flight strip. P-time.
15	EDCT	hh:mm zulu	This is what is sent today on the FDIO flight strip. Estimated Departure Clearance Time
16	Destination Airport	Airport Identifier	
17	Departure Procedure	Published departure procedure/SID issued by ATC	This is a published SID that is filed in the route or automatically applied by ER automation.
18	Transition Fix		This is what is sent today on the FDIO flight strip.
19	ATC Intended Route	Full route for DCL clearance. The current	For this interface, it will be the full route rather than truncated to

#	Data Item	Description	Notes
	(Full Route) [3]	cleared flight plan route with any unacknowledged auto routes already applied. The ATC Intended Route includes to-be-applied AARs that are not to be notified in the current center. It is intended for clients that wish to know the currently expected route of the flight across contiguous ERAM airspace.	fit onto a strip. *ATC Intended Route, end to end with all auto-routes merged.*
20	Local Intended Route	Full route including PDR, PDAR, PAR but only within ARTCC AOI. The flight plan route that recipients of coordinated route data receive. It consists of the flight plan route with any expected-to-be-applied-by-the-controlling-center AARs already applied.	Local Intended route. *TBD if needed* *Clarify what route is available from ERAM FIS to support legacy PDC and departure strip capability.*
21	Flight Strip Route	Filed flight plan. The currently cleared flight plan route. The flight plan route does not include any unacknowledged auto routes. Includes any truncation in order to fit on flight strips.	This is what is sent today on the FDIO flight strip. *Needed to support legacy PDC option for PDR Suppression and provide controller situational awareness (consistency between strip and TDLS display). Assume this will be provided by ERAM FIS to support legacy FDIO capabilities.*
22	Preferred Departure Route (PDR/ADR)	Unpublished departure route (autoroute) that is applied by En Route automation during flight data processing.	This is what is sent today on the FDIO flight strip. *Assumption is that all data elements currently on the FDIO strip should be available in the ERAM FIS service. This is to support legacy PDC as well as ensure user preferences can be satisfied for*

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3 Route definitions extracted from ERAM SIG603, Clearance Data Optimization, Draft, September 2009

#	Data Item	Description	Notes
			DCL.
23	Preferred Departure/Arrival Route (PDAR/ADAR)	Unpublished departure/arrival route (autoroute) that is applied by En Route automation during flight data processing.	This is what is sent today on the FDIO flight strip *and is needed to support legacy PDC.*
24	Preferred Arrival Route (PAR/AAR)	Unpublished arrival route (autoroute) that is applied by En Route automation during flight data processing.	
25	Remarks		
26	ICAO Flight Plan Field 10a	Communication equipment, e.g., capability for data comm	*Assume that the 2012 planned version of ICAO FP will be the flight plan in use during this timeframe.* *Note that FAA (AJE) is working to ensure that the 2012 ICAO FP proposal itself gets into NAS implementation pipeline.*
27	ICAO Flight Plan Field 18 COM and DAT data	Augments Field 10a—free-form to be defined by ATC service provider	*Based on what is put into Field 10a. In ICAO 2012 FP, COM is defined as "communications applications or capabilities not specified in item 10a."* *DAT is defined as "data applications or capabilities not specified in item 10a."* *If there is Jx value in 10a, then look in Field 18 for more formatted data*
28	ICAO Flight Plan Field 18 CODE data	Augments Field 10a—free-form to be defined by ATC service provider	*Based on what is put into Field 10a. If there is a Jx value in 10a, then look in Field 18 for more formatted data. CODE is Aircraft address (expressed in the form of an alphanumerical code of six*

#	Data Item	Description	Notes
			hexadecimal characters) when required by the appropriate ATS authority. Example: "F00001" is the lowest aircraft address contained in the specific block administered by ICAO.
29	Departure Indicator	Indication that flight has departed and/or flight state is now active.	*Equivalent to auto-DM from terminal radar or a manually entered DM. When flight plan is determined to be active, ERAM needs to tell TDLS so TDLS can terminate data comm connection and departure clearance processing.* *This is open issue. There may be better triggers than auto-DM. Assumption is that whatever ERAM uses to determine flight plan state is sufficient for this timeframe.*
30	Drop Flight Indicator	Indicates that the flight has been cancelled or timed out and should be deleted	*If flight plan times out or is cancelled. TDLS to terminate data communication processing.* *Clarify how ERAM SWIM FIS service would handle this.*

Table 3-5 contains the clearance elements that support generation of an automated departure clearance, from TDLS to ERAM. The clearance delivery status is updated when TDLS receives confirmation that a clearance has been successfully delivered to the cockpit or airline operation center. In addition, this table includes a request for flight data, which may be implemented as part of a reconstitution capability.

TDLS shall provide to ERAM the flight data elements identified in Table 3-5 Tower to En Route Flight Information.

Table 3-5 Tower to En Route Flight Information

#	Data Item	Direction	Description	Comments
1	Departure Clearance Delivery Status	Tower to ER	Indicates that the initial pre-departure clearance is delivered and includes whether PDC or DCL:	*This is being planned for PDC in SWIM Seg 1. DCL should work the same. Details TBD for level of granularity, e.g., approved by CD but not yet picked up and Wilco'd. (pending vs. acknowledged)*
2	Departure Clearance Delivery Mechanism	Tower to ER	Identifies expected or current clearance delivery mechanism: Voice, PDC or DCL	*Voice will be default. Will be set when TDLS has determined the expected clearance delivery mechanism. If DCL, flight is eligible to receive revisions via Data Comm.* *If voice clearances are given to a flight marked as a DCL flight, it will revert to voice mechanism. Clients need to recognize that no further updates will be provided via this interface for these flights. (As there are no further updates for legacy PDC.).*
3	Departure Runway	Tower to ER	Expected departure runway in departure clearance.	*Departure runway is optional in the departure clearance; provided if available. Note that this is an expected runway only – actual assignment is done during taxi clearance.*
4	Departure Gate	Tower to	Planned departure	*This is provided by AOC or*

#	Data Item	Direction	Description	Comments
		ER	parking gate from user	*pilot during departure clearance processing, and provided if available*
5	Tower Departure Procedure	Tower to ER	Locally applied departure procedure that is in the departure clearance	*This is currently (optionally) applied from local TDLS application and appended to the flight data in the PDC or new DCL clearance. Will be published but may not be filed in the flight plan or currently applied by automation. Will be provided when available.* *Note that would also require changes to provide and maintain local TDLS adaptation to other NAS systems. This is being added as result of cross-domain discussion with AJE but needs more discussion.*
6	Flight System Plan Revision Number	Tower to ER	Flight plan revision number for which the Departure Clearance delivery status applies	*TBD if needed and exactly what this would be but assume that any departure clearance status would be associated with an ERAM revision indicator. Needs to be worked with the complementary indicator from ERAM. Note that this number matches what ERAM has, NOT necessarily what has been done inside TDLS or with the aircraft.*
7	Request for flight data	Tower to ER	Requests flight data (e.g., flight object) for a specific flight, using appropriate IDs (FLID, FLUID,	*TDLS needs to support reconstitution. TBD if actual flight specific message of if becomes a reconstitution request for all flight or for all flights*

#	Data Item	Direction	Description	Comments
			GUFI).	*departing from the airport. TBD whether request to FIS will support what TDLS has subscribed to or it has to be defined in the request.* *Clarify what ERAM FIS will support for selection and filtering criteria in a request (Get)*

3.2.1.3.2 Information Unit Segmentation

The messages are not segmented.

3.2.1.3.3 Information Flow Direction

The flow of messages is shown in 3-7. Note that these are the assumed subsystems only.

Table 3-6 Interface Summary

Subsystem A			Subsystem B
ERAM	**Messages**	**Direction**	**TDLS**
SWIM FIS	Logon & Session Data	A $\longrightarrow$ B	DCL
SWIM FIS	Flight Data	A $\longrightarrow$ B	PDC/DCL
SWIM FIS	Clearance Data	A $\longleftarrow$ B	PDC/DCL
SWIM FIS	Session Data	A $\longleftarrow$ B	DCL
SWIM FIS	Flight Data Updates[4]	A $\longleftarrow$ B	DCL
???	TDLS Status[5]	A $\longleftarrow$ B	TDLS/?

3.2.1.3.4 Conditions for Transmission

3.2.1.3.4.1 Flight data shall be transmitted by ERAM when data is transmitted to the tower FDIO for strip printing.

Derivation Guidance: TDLS does not want flight data until there is a flight strip in the tower, with the exception for an explicit query to the ERAM FIS service. This requirement may evolve for later phases, but the current operational requirement is that there will be no display of flight data on TDLS until there is a strip available. The TDLS team has made a preliminary design decision that the interface and service provider should support this capability rather than internal TDLS software.

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4 Extensible requirement for updating/amending flight data within TDLS. Details TBD.
5 Extensible requirement for overall M&C between interfacing systems. Details TBD

3.2.1.3.4.2 Flight data shall be transmitted by ERAM when ERAM receives a request through the ERAM SWIM FIS service in accordance with the ERAM SWIM IRD [3].

Requirements in the ERAM SWIM IRD are not repeated in this document unless they provide some clarity or serve as a placeholder.

3.2.1.3.4.3 Once flight data has been transmitted by ERAM SWIM to TDLS, ERAM shall provide flight data to TDLS whenever there is a change in the flight data in accordance with the TDLS subscription for selection and filtering of the data.

Design Guidance: The current desired functionality is for ERAM to provide a data distribution timer management that ties the flight data to TDLS to the strip data posting, using all the filtering and selection criteria available in the ERAM FIS service. (Note that there are other design options available, which need to be explored.) Once the data has been sent, then the FIS service should send an update whenever there is a change to any of the TDLS-selected data. .

3.2.1.3.4.4 Flight data shall be transmitted by ERAM in response to a reconstitution request.

3.2.1.4   Design Workload

3.2.1.4.1 At each Tower facility, the supportable peak Efficiency-Critical transaction rate between ERAM and TDLS shall be at least 30 transactions per minute.

3.2.1.4.2 For the Tower domain, the supportable peak Efficiency-Critical transaction rate between ERAM and TDLS shall be at least 200 transactions per minute.

3.2.1.4.3 At each Tower facility, the supportable peak Efficiency-Critical information rate between ERAM and TDLS shall be at least 7000 bytes per minute.

Derivation Guidance (Byte Rates): The information rates are based on forecasted PDC byte rates using measured current PDC byte rates. The byte rate figures may include some amount of communication overhead (e.g., upper layer message headers) DO NOT include lower layer transaction messaging/overhead or SWIM-type message encoding overhead (e.g. XML, SOAP).

3.2.1.4.4 For the Tower domain, the supportable peak Efficiency-Critical information rate between ERAM and TDLS shall be at least 45000 bytes per minute.

3.2.1.4.5 At each Tower facility, the supportable peak Essential transaction rate between ERAM and TDLS shall be at least 15 transactions per minute.

3.2.1.4.6 For the Tower domain, the supportable peak Essential transaction rate between ERAM and TDLS shall be at least 95 transactions per minute.

3.2.1.4.7 At each Tower facility, the supportable peak Routine transaction rate between ERAM and TDLS shall be at least 1 transaction per minute.

3.2.1.4.8 For the Tower domain, the supportable peak Routine transaction rate between ERAM and TDLS shall be at least 75 transactions per minute.

3.2.1.4.9 Response Times

There are assumed to be logical acknowledgment AP responses to these data exchange messages. ERAM FIS will send back an acknowledgement if and when a client exercises the update function.

The transport layer protocol identifies connection loss and informs the sending AP. This indicates either communication failure or failure of the receiving system.

Derivation Guidance: These response times are meant to include FTI time, ESAS time, TDDS (as applicable time). It excludes primary ERAM response time. This is a two-way transaction time (e.g. request/reply, transmission/acknowledgment). Transaction time is for the application layer exchange.

3.2.1.4.9.1 While the interface is exchanging data at the Design Workload in the Full Configuration, the 95th percentile transaction time shall be less than 30 seconds.

Rationale: Times based on estimates for current host data distribution performance. Future systems should not exhibit performance worse than today. Note that this needs to be upleveled to the ERAM-FDIO interface transaction time requirements.

3.2.1.5 Quality of Service

3.2.1.5.1 General

3.2.1.5.1.1 The Quality of Service requirements shall apply to the entire non-TDLS service string.

Derivation Guidance: This interface availability includes the entire upstream (e.g., ERAM FDP, ERAM SWIM, FTI, etc.) availability requirements up to the demarcation point of the interface, which is defined as the TDLS boundary, regardless of the actual implementation.

3.2.1.5.2   Availability

3.2.1.5.2.1 Efficiency-Critical data exchange functions shall have an availability of at least 0.99997.

3.2.1.5.2.2 The total time that Efficiency-Critical data exchange functions are not available because of unscheduled maintenance or repair shall not exceed 16 minutes per year.

3.2.1.5.2.3 Essential data exchange functions shall have an availability of at least 0.9997.

3.2.1.5.2.4 The total time that Essential data exchange functions are not available because of unscheduled maintenance or repair shall not exceed 2.75 hours per year.

3.2.1.5.2.5 Routine data exchange functions shall have an availability of at least 0.997.

3.2.1.5.3   Reliability

3.2.1.5.3.1 For Efficiency-Critical data exchange functions, the 99th percentile outage time shall be less than 3 minutes.

3.2.1.5.3.2 For Essential data exchange functions, the 99th percentile outage time shall be less than 10 minutes.

3.2.1.5.3.3 For Routine data exchange functions, the 99th percentile outage time shall be less than 1.68 hours.

3.2.1.5.3.4 The Efficient-Critical data exchange functions shall have no single point of failure.

3.2.1.5.3.5 The Essential data exchange functions shall have no single point of failure.

3.2.1.5.3.6 A single failure shall not cause the loss of a data transaction.

3.2.1.5.4 Data Accuracy

Design Guidance: While for RMA, the ERAM-TDLS interface has no more strict class than Efficiency-Critical, the data integrity requirements are Safety-Critical.

3.2.1.5.4.1 For Efficiency-Critical data exchange functions, the undetected transaction corruption rate shall be less than or equal to 1E-07.

3.2.1.5.4.2 For Essential data exchange functions, the undetected transaction corruption rate shall be less than or equal to 1E-07.

3.2.1.6 Health Checking

3.2.1.6.1 The interface shall support a periodic exchange of health check messages in both directions across the interface to support outage requirements.

Derivation Guidance: In order for both interfacing systems to promptly detect interface failures even when application message traffic is sporadic, the interface will allow for periodic health checking by the end systems or intermediate systems. This is on the assumption that logically, the receiving system wants to monitor the status of the sending system. Note that there are separate M&C requirements for Data Comm that are independent of this IRD. This is a placeholder for the assumed requirements for both interfacing end systems to provide for health checking.

3.2.1.7 Data Recording

3.2.1.7.1 The interface shall support data recording of all exchanges in both directions across the interface.

This is a placeholder to ensure the interface messages are captured and recorded regardless of the actual implementation.

3.2.1.8 AP Error Handling

This IRD imposes no explicit AP error handling requirements.

Error handling as provided by SWIM end systems and intermediate systems is assumed to be sufficient for this ground-ground interface.

3.2.1.9 Interface Summary Table

The messages to be transmitted across the interface are summarized in Table 3-7.

3.2.2 Protocol Implementation

This interface is assumed to use TCP over IP over Ethernet. The following requirements are assumed to be relevant, but actual specifications are left to the implementing IRDs.

3.2.2.1 Application Services

TBD

3.2.2.2 Network Services

This interface shall use TCP for the transport protocol. This interface shall use the IP for the network protocol.

This interface shall use the 802.3 standard (Ethernet) for the link layer protocol.

3.2.2.3 Naming and Addressing

Not applicable to this functional document.

3.2.3   Security

3.2.3.1   The interface shall provide security in accordance with the Data Comm Program requirements [1].

Data Comm has separate security requirements. This is placeholder to ensure the Data Comm fPR (or other relevant security documents) are complied with.

3.2.4   Interface Design Characteristics Table

N/A to this document.

3.3   Physical Design Characteristics

This entire section is not applicable to this document, which describes the functional requirements only. .

4 QUALITY ASSURANCE PROVISIONS

The following sections describe the quality assurance provisions for the interface.

4.1 Responsibility for Verification

The government has responsibility for developing and implementing the verification of requirements for each project. The government may delegate verification activities to other organizations, independent contractors, and/or the major prime contractor. The Test and Evaluation process guidelines within the Acquisition Management System (AMS) shall be used and shall be tailored as necessary for the levels and methods of verification in the Verification Requirements Traceability Matrix (VRTM). These activities will be performed under the relevant IRDs and are not further defined in this document.

4.2 Special Verification Requirements

The special verification requirements shall include, but not be limited to those defined in the following paragraphs.

4.2.1 Data Communications Program Software Assurance

The Application Processes that support this interface shall demonstrate a Software Integrity Assurance Level 3 (SWAL3).

This requirement may be levied on the entire Data Comm program and therefore on the components of the service string, including both the end systems and the interfaces. To be verified. [1]

4.2.2 ISO Conformance

Any protocols used in this IRD shall demonstrate ISO conformance using a test method or certification that is approved by the FAA.

4.2.3 ISO Interoperability

Any protocols used in this IRD shall demonstrate ISO interoperability using a test method or certification that is approved by the FAA.

4.2.4 Non-ISO Interoperability

Prior to the start of integration level verification, functional interoperability shall be demonstrated at the William J. Hughes Technical Center (WJHTC) System Support Computer Complex, or other appropriate demonstration site.

4.3 Verification Requirements Traceability Matrix

Not applicable to this functional document.

4.4   Requirements Traceability Matrix

Placeholder for a preliminary traceability matrix from this IRD back up to the Data Comm high level program requirements, as encapsulated in the final Requirement Document (fRD) [Ref 1]. This will be provided for reference ONLY.

5   PREPARATION FOR DELIVERY

This IRD imposes no explicit Preparation for Delivery requirements.

6　NOTES

6.1　Definitions

The following definitions apply to the terms used in this IRD:

ATC Intended Route. The current cleared flight plan route with any unacknowledged auto routes already applied. The ATC Intended Route includes to-be-applied AARs that are not to be notified in the current center. It is intended for clients that wish to know the currently expected route of the flight across contiguous ERAM airspace.

Demarcation (point of): A specific point in a chain of hardware and interconnecting circuitry where a change of responsibility for provisioning installation, and operation of the hardware and circuit configuration occurs.

Departure Clearance. Generic term for a pre-departure clearance that is provided to the aircraft while on the ground and prior to pushback from the gate. Includes the route of flight to the destination. PDC is the legacy version that is sent to an AOC, which delivers it to the pilot via various mechanisms. DCL is the new CPDLC clearance from the ground automation directly to the aircraft via data communications.

Flight Information Service. There are two separate FIS services. There is an international Data Communications Flight Information Service that provides terminal environmental information used by flights, and the ERAM SWIM FIS service, which is the SWIM flight data service for NAS automation systems.

Flight Plan Route. The currently cleared flight plan route. The flight plan route does not include any unacknowledged auto routes. It is intended for clients that wish to know the currently cleared route.

Interface: The means of communication, including hardware and software, between two entities.

6.2　Abbreviations and Acronyms (in progress)

A/N	Alphanumeric
AMS	Acquisition Management System
AOC	Airline Operations Center
ARTCC	Air Route Traffic Control Center
ATIS	Automatic Terminal Information Service
CPDLC	Controller Pilot Data Link Communciations
Data Comm	Data Communications (in context, shorthand for FAA program)
D-ATIS	Digital Automatic Terminal Information Service
DCL	Departure Clearance via CPDLC from ground automation to the aircraft.
ERAM	En Route Automation Modernization

FAA	Federal Aviation Administration
FDIO	Flight Data Input Output
FIS	Flight Information Service.
ICD	Interface Control Document
ISO	International Standards Organization
IRD	Interface Requirements Document
NAS	National Airspace System
OSI	Open Systems Interconnection
PDC	Pre-Departure Clearance. "Legacy" departure clearance from ground automation to Airline Operations Center
TDDS	Terminal Data Distribution System
TDLS	Tower Data Link System
TFDM	Tower Flight Data Manager
TRACON	Terminal Radar Control facility
VRTM	Verification Requirements Traceability Matrix
WJHTC	William J. Hughes Technical Center

Appendix A: Departure Clearance Formats

This appendix contains examples of the format of a legacy PDC message and a draft of the expected format of a new DCL message. **These are provided as information only.**

Legacy PDC:
The legacy PDC message in Figure A-1 is sent from TDLS to the Airline Operations Center (AOC) computer, via intermediate systems/networks. The DCL message will be sent from TDLS to the aircraft avionics, also via intermediate systems/networks. Note that the DCL message format is still being defined by a joint RTCA/EUROCAE working group; a final version is expected in December 2009.

Table A- 1 Legacy PDC Format

Line #	PDC Format Description	Max. Length	Example: Clearance sent to AOC for DFW	Line #
	{Header} ADNS Message Priority and Destination address	10	QU TULDXAA **CR LF**	1
	{Header} ADNS Source Address and Time Stamp	16	.DFWTWXA ddhhmm **CR LF**	2
	{Header} System Message Identifier	4	**STX**PDC **CR LF**	3
1	Sequence number (modulo 1000) **CR LF**	3	999 **CR LF**	4
2	Aircraft ID **TAB** Mode 3/A Beacon Code **TAB** Departure Point **CR LF**	9/5/10	AAL158 **TAB** 3646 **TAB** DFW **CR LF**	5
3	Number, Heavy Jet Indicator/ **TAB** Departure Time **CR LF**	15/6	H/DC10/A **TAB** P0202 **CR LF**	6
4	Computer Identification Number **TAB** Altitude **CR LF**	4/4	209 **TAB** 370 **CR LF**	7
5	Route Information **CR LF**	30	-DALL6 TXK LIT- **CR LF**	8
6	Route Information **CR LF**	30	DFW DALL6 TXK J131 PXV **CR LF**	9
7	Route Information/Remarks **CR LF**	30	FWA V11 V100 MOTER DTW **CR LF**	10
8	Estimated Departure Clearance Time **CR LF**	6	0213 **CR LF**	11
9	Revision Number/Strip Request Originator of an SR **CR LF**	20	1 **CR LF**	12
10	{Departure Frequency data field 1} **CR LF**	40	{MAINT. 10,000 EXP REQ ALT 10 MIN AFT T/O} **CR LF**	13
11	{Altitude Restriction data field 2 } **CR LF**	40	{CONTACT DEP CTRL ON 118.55} **CR LF**	14
12	{Standard Instrument Departures data field 3 } **CR LF**	40	{READ BACK TO CLNC DELIVERY REQUIRED} **CR LF**	15
13	{Free Text} **CR LF**	40	**CR LF**	16
14	{Free Text} **CR LF**	40	**CR LF**	17
15	{Free Text} **CR LF ETX**	40	**CR LF ETX**	18

1. 15 lines of data formatted for PDC. Lines 2, 3, and 4 have numbers indicating maximum length of the two fields.
2. Items in red are specific to PDC.

DRAFT DCL Template:

The following table represents the logical fields to be includes in the new Departure Clearance issued by the ground automation and provided directly to the aircraft under Data Comm Segment 1.

This table is derived from a draft whitepaper being used by RTCA SC214/EUROCAE WG78 [New UM73 Departure Clearance Routing Message Definition, DCL-WP-03E, 10/30/09,]

Key: M   =   inclusion mandatory, part of every message
        O   =   inclusion optional
        C   =   inclusion conditional

Table A- 2 DCL Parameters by Message Type below illustrates how both the initial flight data and revised flight data that the tower receives from En Route is used to generate a DCL. In addition, it illustrates the information that is received by TDLS from the aircraft, and is thus optionally available to share with ERAM. For the initial Departure Clearance, mandatory fields are identified. For revised departure clearances, only the fields that changed or that are mandatory in the existing FANS standards will be included. If a field is changed, TDLS expects to get the data from ERAM and then provides it to the aircraft, satisfying the requirement in the phrase *"Conditional, provided when changed"*.

Table A- 2 DCL Parameters by Message Type

Data	*Request Departure Clearance*	*Initial Departure Clearance*	*Revised Departure Clearance*
Aircraft Identification	Mandatory	Mandatory	Mandatory
Aircraft Type	Optional		
Location Identifier	Optional		
ATIS code received	Optional		
Preferred Departure Runway	Optional		
Preferred Cruise Level	Optional		
Take-off weight	Optional		

Data	Request Departure Clearance	Initial Departure Clearance	Revised Departure Clearance
Free Text for Additional Information	Optional	Optional	Optional
Clearance Limit		Mandatory	Conditional, provided when changed
SID and/or departure route		Mandatory	Conditional, provided when changed
Initial Level		Optional	Conditional, provided when changed
Cruise Level		Optional	Conditional, provided when changed
Allocated SSR Code		Conditional, provided when available	Conditional, provided when changed
Frequency and Unit Name of Next Controller		Conditional, provided when available	Conditional, provided when changed. Can be optional when provided in AIP, for instance.
Approved time of departure		Conditional, provided when applicable	Conditional, provided when changed
Current ATIS Code		Optional	Conditional, provided when changed
Departure Runway		Optional	Conditional, provided when changed

Data	Request Departure Clearance	Initial Departure Clearance	Revised Departure Clearance
Startup Approval		Optional	Prohibited

This example clearance shows the breakdown of the fields used:
(a) AWE1208 (c) cleared to PHX VORTAC (d) via the Pittsburgh Nine departure (e) vectors BSV, GSH, OKC, direct. (f) Maintain 5000 expect Flight Level 350 one zero minutes after departure (h) Hold east as published. Expect further clearance at 1500. Time now 0800. (i) Expect direct ASU for the river visual approach to Runway 27R.   (j) Departure frequency 124.75. (k) Squawk 4315.

Appendix B: TDLS-FDIO Architecture Overview

This appendix provides notional diagrams for current and Data Comm Segment 1 TDLS-En Route Functional Interfaces. Figure B- 1 represents a simplified overview of the current FDIO architecture in the tower. Note that the ARTCC portion is changing, e.g., CCU is being replaced. This diagram is provided for context only.
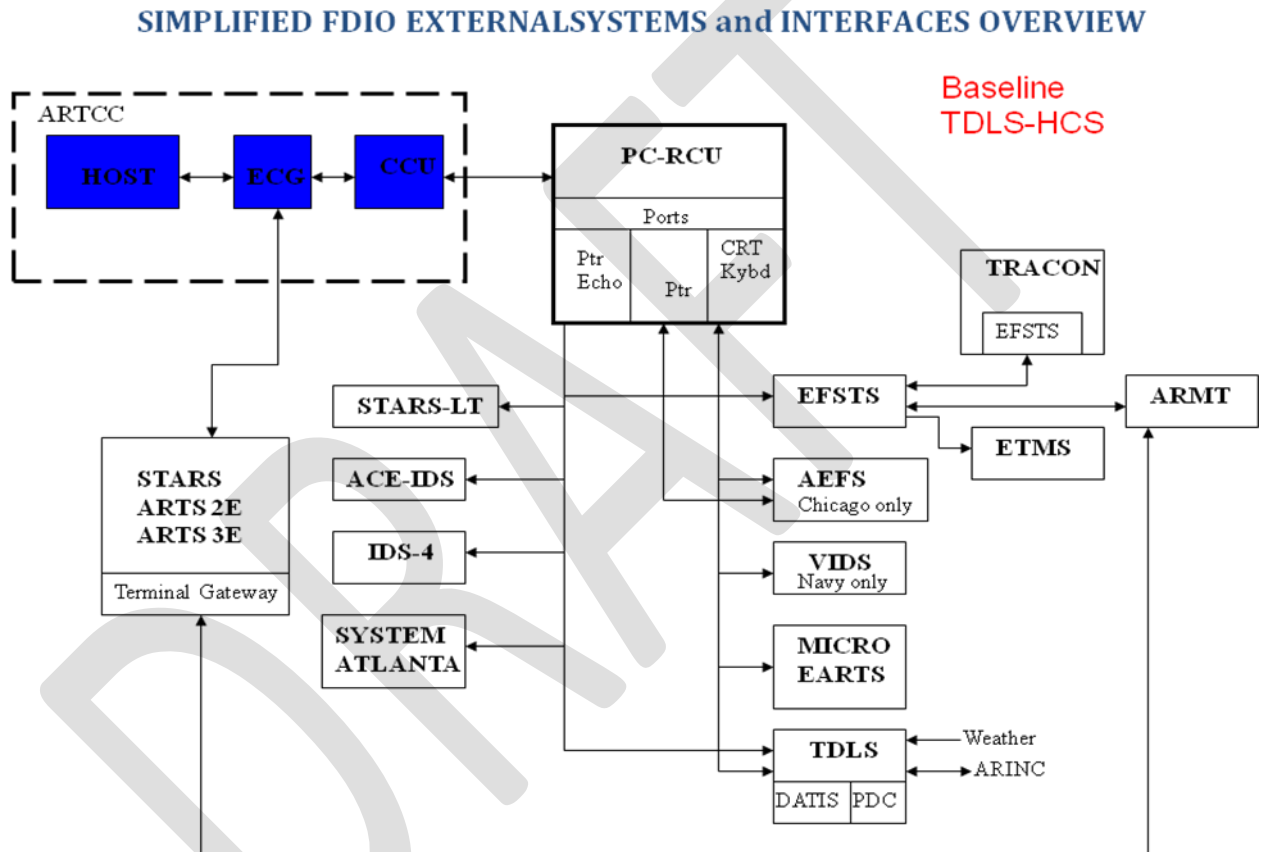

Figure B- 1 Baseline HCS-FDIO-TDLS Interface

Figure B- 2 represents a simplified version of the TDLS interface to FDIO in the tower. Note that the TDLS/PDC application uses a single one-way port and the TDSL/FDIO Emulator application uses two separate and different two-way ports.
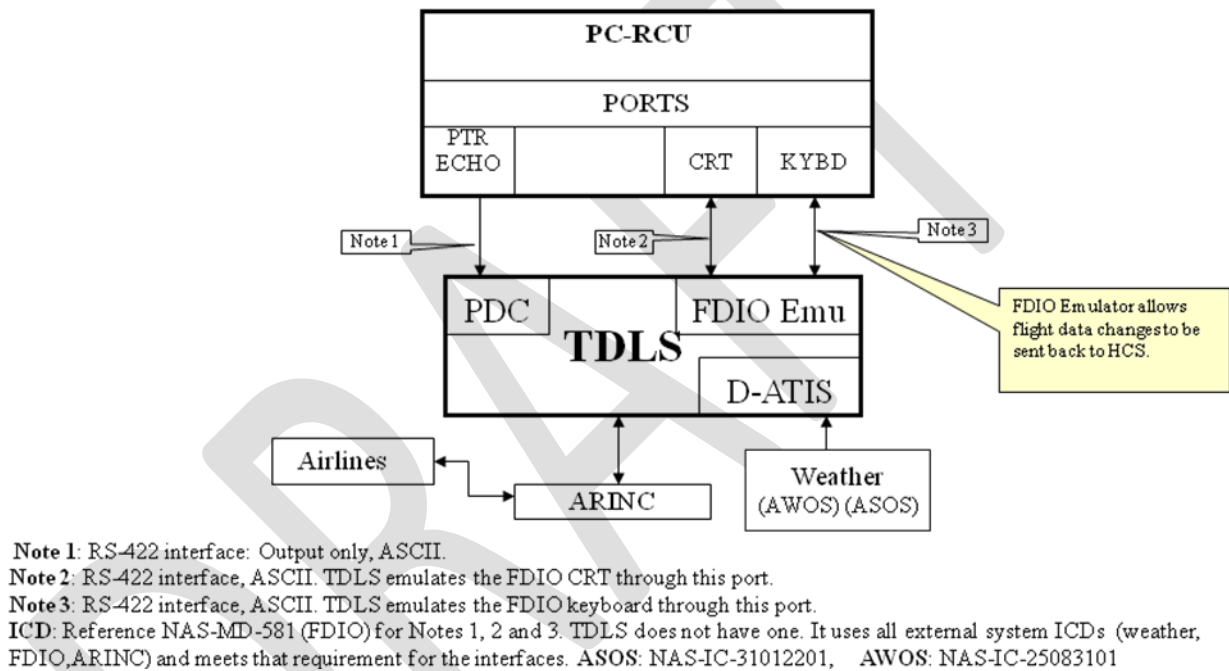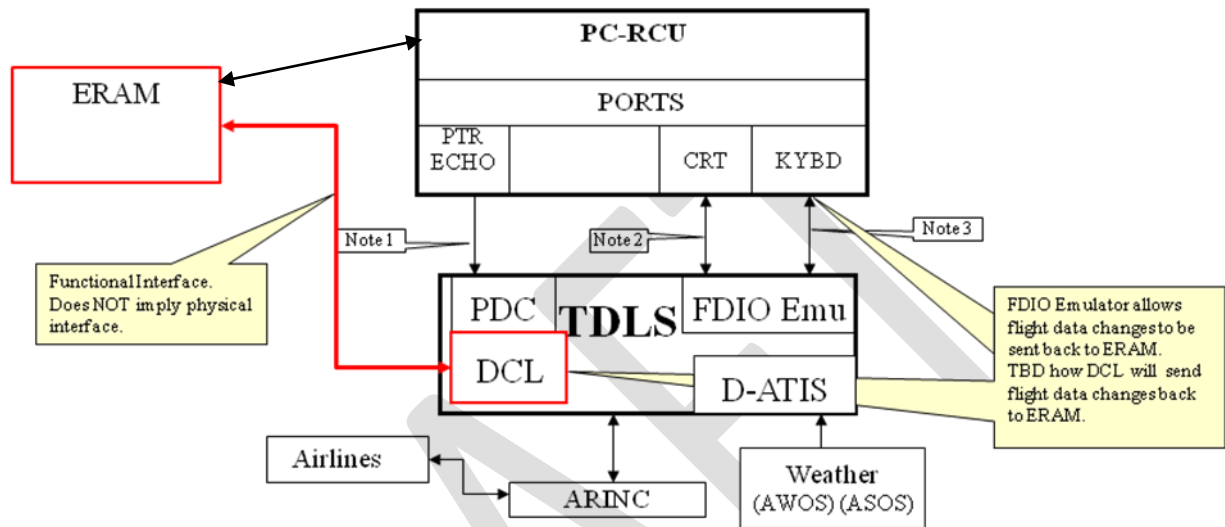

Figure B- 2 Baseline FDIO-TDLS Interface

Figure B- 3 represents the expected TDLS-ERAM functional interface for Data Comm Segment 1. Note that the legacy TDLS/PDC one-way interface from FDIO may be OBE but is shown on this diagram as a transitional interface to support legacy PDC capabilities. The new TDLS/DCL application uses a different interface to ERAM SWIM.

Note 1: RS-422 interface: Output only, ASCII. **May be deleted.**
Note 2: RS-422 interface, ASCII. TDLS emulates the FDIO CRT through this port.
Note 3: RS-422 interface, ASCII. TDLS emulates the FDIO keyboard through this port.
ICD: Reference NAS-MD-581 (FDIO) for Notes 1, 2 and 3. TDLS does not have one. It uses all external system ICDs (weather, FDIO,ARINC) and meets that requirement for the interfaces. ASOS: NAS-IC-31012201,   AWOS: NAS-IC-25083101

Figure B- 3 Data Comm Seg 1 TDLS- ERAM Functional Interface

Appendix C: Extensible Interface Requirements

The following requirements represent extensible interface requirements between TDLS and ERAM. These requirements support functions that are not currently planned for the early TDLS Phase 1 implementation in 2012 and may not be in the later Phase 2 implementation in 2014.

<u>Flight Information</u>

The following tables are a placeholder for information provided to ERAM when a TDLS user requests a flight plan amendment or updates tower clearance data prior to clearance delivery. Unchanged fields are omitted from the amendment message. *Note that the current approach is to leverage the existing TDLS FDIO Emulator capability, not replace it with a TDLS/DCL Amendment capability in this timeframe. Therefore this table represents whatever is currently allowable and provided from FDIO in the tower, with the addition of the tower departure procedure and departure runway. This table is a placeholder only, for discussion.*

Table C- 1 Flight Data Update from TDLS to ERAM, High Level

#	Data Item	Description	Notes
	Flight Plan Amendment	Possible Data Comm requirement for Seg 1 to allow Amendment to be generated from TDLS	*OPEN ISSUE. Not for 2012 but TBD whether in scope for any of Segment 1. Keep in the IRD until resolved. Note that this does NOT presume that TDLS has to convert from using FDIO interface in this timeframe; neither does it preclude it.*

Table C- 2 Flight Data Update from TDLS to ERAM, Detailed

Data Item	Notes
Aircraft ID	Callsign
Computer Identification (CID)	HCS/ERAM ID
Flight Unique ID	Includes departure airport, callsign, date, time, and instance number
Revision Number	Identifies the revision to which the update is applied.
Change Type	New, Update, Cancel

Data Item	Notes
Aircraft Type and Equipage	Per 7110.65
Proposed Departure Time	Hh:mm zulu
Cruise Altitude	Hundreds of feet MSL or flight level for class A airspace
Destination Airport	ICAO Code
Route	Requested route excluding departure procedure or preferred departure and arrival routes
Assigned Beacon Code	Local override of center assigned beacon code
EDCT	Hh:mm zulu
Tower Departure Procedure	Locally applied departure procedure that is in the departure clearance

Table C- 3 Flight Data from ERAM to TDLS

#	Data Item	Description	Notes
	Flight Plan Amendment Message Response	Response back to TDLS when TDLS send a flight plan amendment to ERAM, e.g., message accepted/rejected	*OPEN ISSUE if this is within scope for Data Comm Seg, but is definitely not part of Phase 1 (2012) functionality.* *Note that this does NOT presume a specific design – could be satisfied by using existing TDLS FDIO Emulator capability or could be satisfied by a totally new interface with ERAM.*

Interface Status Information

Table C- 4 contains the monitoring and health status data for the Tower- En Route interface. *Note that these Monitor and Control (M&C) requirements are in progress, and are dependent on the actual implementation.* This is a placeholder only.

Table C- 4 Tower - En Route Interface Status

#	Data Item	Direction	Description	Comments
1	TDLS ID	Tower to ER	Identifies the TDLS system	*Assume this will be Airport ID*
2	TDLS State	Tower to ER	Operational state of TDLS system	
3	Time	Tower to ER	Hh:mm zulu	*May not be needed if universal timestamp, but this could be time of status*
4	Reconstitute Indicator	Tower to ER	Used upon TDLS initialization to reconstitute flight data. ERAM responds by sending flight data messages for all retained departures	*Open issue*
5	DCL Service Status	Tower to ER	Status of DCL service, independent of TDLS status	*This is for system monitor and control services. Clarify usage???*